

# WET EFFECTS

Aquatic Resources Education Newsletter



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## NEWS

What's new and exciting in the Aquatic Education program? Many of you may remember our "Kids Fishing" booklet from years past, which featured educational activities for kids. Good news! We just received a new shipment. This means we have booklets available for you and your students. You can pick up copies of the booklet at our main office or the Aquatic Resources Education Center. To arrange a time to pick up booklets call our office at (202) 535-2260.



In other news: Teacher workshops are back! Again this year we will be conducting several teacher workshops. If you haven't already received a schedule of workshops, you

should receive one within the next few weeks.

## In this Issue

In this edition of the newsletter we will focus on the topic of symbiosis. We will define symbiosis and examine the three forms it takes: mutualism, commensalism and parasitism. Additionally, we will look at examples of symbiosis that can be found in aquatic environments.

## Symbiosis

When we look at ecosystems, it is clear that no organism is independent of other living things. In communities there are often complex relationships between the inhabitants. In food chains, producers, consumers and decomposers depend on each other for survival. Though some of these relationships are quite easy to see, others are far more obscure. For example an animal eating a fruit or vegetable might be seen as one species depending on another for survival, this is a short-term and indirect relationship, not symbiosis. The

animal in this example probably did not directly depend on the particular species of fruit or vegetable that it ate, although it requires food of some kind. Some of the relationships between species are long term and far more intimate, and are termed symbiotic.

Species involved in symbiotic relationships are termed symbionts and may benefit from, be harmed by, or be unaffected by the relationships with their symbiotic partners. Symbiosis can take three forms: mutualism, commensalism and parasitism. In the next few pages we will examine all of these types of relationships and look at examples of each.

## Mutualism

The word mutual means having the same relationship each to the other. An example of this would be mutual friends. When we say, "the feeling is mutual" it means we share the same feeling. In biological terms mutualism refers to organisms having a relationship, which offers some sort of benefit. Mutualism is a form of symbiosis in which all involved organisms

benefit. There are many examples of mutualism in an aquatic environment. One such relationship is found in the various coral reefs of the world. Corals, which may superficially resemble plants, are actually animals. However, much like plants many corals, termed hermatypic corals, rely on sunlight for nutrition in much the same way a plant does. A plant uses the sunlight as an energy source for photosynthesis. How does a coral, which is an animal, rely on the sunlight to produce food?



**Above:** A *Goniopora* sp. coral. Although superficially this beautiful creature may resemble a plant, it is in fact an animal. However, due to its symbiotic relationship with the dinoflagellate, zooxanthellae, much of its nutrition is derived by means of photosynthesis.

It is due to the association many corals have with the dinoflagellate (a type of algae) called zooxanthellae. The zooxanthellae, or algae, actually live within the tissues of the coral. The zooxanthellae in the coral photosynthesize and produce carbon, nitrogen and oxygen that the coral needs to survive. In turn, the zooxanthellae get the benefit of protection or a safe home. Inside the tissue of the coral the

algae are protected from predation.

## Commensalism

In a biological sense commensalism is a type of relationship in which two or more organisms live in close association, in which one may receive some benefit, but none of the organisms involved are harmed. Unlike mutualism where all of the symbionts benefit from the relationship, in commensalism only one of the partners gains a benefit.

One example of this type of relationship is seen in crabs that live in between the tentacles of sea anemones, like those of the genus *Neopetrolisthes*. The small filter feeding crab lives on the surface of the sea anemone, where it gains protection and a safe place to live and eat. Although the sea anemone gains no specific benefit from the relationship, neither is it harmed in any way by the association.

Another example of this type of relationship is seen between the oyster crab (*Pinnotheres ostreum*) and the American Oyster (*Crassostrea virginica*). The larvae form of the crab enters the oyster, where it lives and shares the food that is pumped in by the oyster. Usually only one or two crabs are found in each oyster, but as many as 200 have been reportedly found in a single oyster.



**Above:** The common Anemone Crab, *Neopetrolisthes maculatus*.

## Parasitism

Certainly you have heard the phrase "blood sucking leech" ; well, a leech is an animal that feeds on the blood of another animal. A leech is an example of a parasite, an organism that exists at the expense of another. In biological terms parasitism is a relationship in which one member, the parasite, benefits and the other, the host, is adversely affected. Although a parasite obtains nutrition from its host, and the host may be weakened, the parasite rarely directly kills the host as a result of taking its nutrition. Certainly if you were an organism that made your existence stealing nutrition from others, it would be counterproductive if you killed your host organism. Parasites can take many forms and can be found both internally, like a tapeworm, or externally like a tick. Parasites are sometimes vectors for disease, like the mosquitoes carrying the West Nile virus. In this quarter's Creature Feature, we will look at an example of a parasite.

# Creature Feature



## The Sea Lamprey

*Petromyzon marinus*

The picture above looks like something from a science fiction movie. Is it an alien being? Believe it or not, it is actually a fish called a Sea Lamprey. The Sea Lamprey is a very primitive eel-like fish that has no jaw and a cartilaginous notochord. The adult Sea Lamprey is parasitic and has a very special mouth that is well adapted to its parasitic existence. The mouth is round and lined with sharp teeth that it uses to attach to a host fish. The Sea Lamprey has a piston-like tongue that it draws inward to create suction when attaching to a host fish or other surfaces such as rocks. The adult Lamprey feeds on the blood and body fluids of its host fish. It is able to get a continuous flow of blood from the fish since it releases an anticoagulant, which prevents the host fish's blood from clotting.

The Sea Lamprey has a very interesting life cycle. Although you might assume that the Sea Lamprey would live only in the ocean, did you know that they actually can be found in the District of Columbia? In fact, all lamprey species breed in fresh water, often in clear, sandy and gravel bottom streams. Adults migrate to fresh water, where they make shallow nest and lay up to 62,500 eggs. After spawning, which occurs only once in a lifetime, the adult dies, usually within two to three months. Once the eggs hatch, the larvae settle in the substrate of the stream where they will remain for at least four years. Unlike the adult the juvenile or ammocoete, is not a parasite. The young lamprey, in fact, is blind and toothless and survives by filter feeding.



Adult lamprey are parasitic and feed on the blood and body fluids of other fish.

### QUICK FACTS

**Size:** Up to 33 inches

**Habitat:** Sea, Fresh water, and Estuarine

**Color:** Olive brown above, pale below

**Range:** Gulf of St. Lawrence south to North Florida and The Great Lakes.

## Fishing Corner

Although it may be cold now, it won't be long until the days are getting longer and the air is getting warmer. Fishing can be a great activity for you and your class. So it is a good time to start brushing up on your fishing knowledge. If you don't have the right equipment you can even borrow fishing equipment from the Fisheries and Wildlife Division. Call us today!

# What Do I Use For Bait?

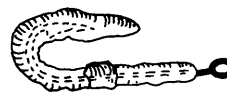
## HOW DO I BAIT MY HOOK?

**It is easy to stab yourself with a fish hook!  
Be very careful.**

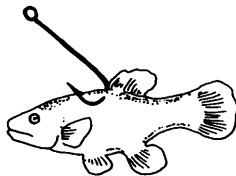
**Worms** are a favorite fish bait. The worm will wiggle. Hold it tightly at one end with your thumb and finger. Bring the hook down through one end of the worm until the worm covers the hook. Pull the hook down; don't try to push the worm on the hook. Worms are found in rich soil, under leaves in the woods, or in gravelly soil along streams. Keep them in a can with damp soil in the shade.



When fishing for catfish or bass, hook worm like this. Leave the end free to wiggle.



For sunfish and other "bait-stealers," hook bits of worms like this.



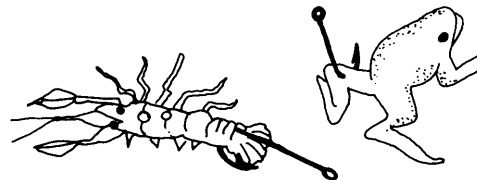
**Minnows** used for bait are usually 1 to 3 inches long. Put the hook through the very top of its back, just in front of the fin, so the minnow can swim. You will probably want to buy your minnows. Keep them in a minnow bucket in shaded water.



**Grasshoppers** and **Crickets** are good summer bait. Hook them through the collar that is just behind their necks. The hook should be slipped under this collar so that the point is exposed. This keeps the insect alive and will attract fish. Grasshoppers are found in tall grass and are kept best in a small wire cage.



**Doughballs** are the best bait for carp. These are easily made from flour, bread, cornmeal, or wheaties dampened with water and honey. Form in a tight ball. Press on small hook.



Live **crawdads** and small **Frogs** are good bass bait. Crawdads are found under rocks in the water. Hold them along the back, so you won't get pinched, and push the hook through the tail. Hook small frogs, which are found along the shore, through both lips or a leg.



# Biology Quiz

## Directions:

What types of symbiotic relationships are represented below? Read the text and decide. Choose mutualism (M), commensalism (C), parasitism (P), or if you think there is no relationship choose (N). See the answers at the bottom of page six.

1) A **sea anemone** is an animal that looks like a beautiful undersea flower. The anemone however can be an active predator that captures and eats fish with its stinging tentacles. A **clown fish** is a species that is immune to the sting of the anemone and lives in a symbiotic relationship with sea anemones. This makes the anemone a safe place for the clown fish to live. In turn the anemone receives food from the clown fish. Both partners benefit from the association.



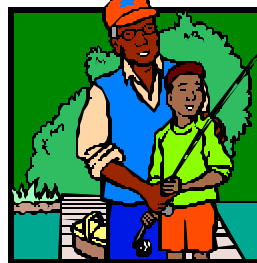
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= ☐ M ☐ C ☐ P ☐ N

2) **Ticks** are members of the same class, Arachnida, as spiders. Ticks are arthropods that feed on the blood of mammals, birds and reptiles. Ticks will also feed on the blood of **humans**. Additionally ticks often carry diseases that can cause severe illnesses in humans, such as Rocky Mountain spotted fever and Lyme disease. Although the tick gains nutrition by feeding on the blood of its host, a human would receive no benefit from an association with a tick.



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= ☐ M ☐ C ☐ P ☐ N

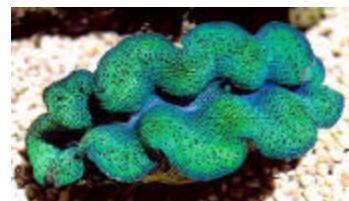
3) A **remora**, also sometimes referred to as a sucking fish, is the name given to members of a group of fish that commonly attach to larger fish. Remoras have flat, oval shaped suction disk on the tops of their heads, which they use to attach themselves to **sharks**, and other marine animals. The remora often rides on the host and eats any food that the host leaves behind after a meal. The remora, therefore, benefits by getting the shark's leftover food. The shark does not benefit, but is not harmed by the association.



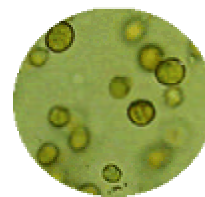
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4) A **Tridacnid clam** is a bivalve that has an association with algae called **zooxanthellae**. The algae live inside the tissue of the clams, where it is protected from predators. The clam benefits by receiving nutrients produced by the algae. Both partners benefit from the association.



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= ☐ M ☐ C ☐ P ☐ N

# A Simple Experiment

## Cold as Ice



**Purpose:** To determine why the ocean is not frozen at the poles.

**Materials:** 2 Paper Drinking Cups  
Table Salt  
Measuring Spoon (Tablespoon)  
Marking Pen  
Freezer

### Procedure:

1. Fill both cups half way with water.
2. Dissolve 1 tablespoon of salt into one of the cups of water.
3. Mark an "S" on the cup containing salt.
4. Place both cups in the freezer.
5. Observe the cups the next day.

**Results:** The salt water did not freeze.

**Discussion:** Water freezes at 32°F (0° Celsius), but salt depresses or lowers the freezing point of the water. The more salt in a solution of water, the lower the temperature needs to be to freeze the water. The dissolved salt blocks the water molecules from linking to form ice crystals. As blocks of ice form at the poles, the salt is left behind, making the remaining water even saltier. The saltier the water is the more resistant it is to freezing. Therefore, even in sub-zero temperatures water exists in a liquid form.